

Application Number 10/039,669
Response dated January 5, 2004
Responsive to Office Action of October 6, 2003

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Claim 1. (Original) A method of calibrating an imaging device comprising:
characterizing the imaging device with a device model such that an average error between expected outputs determined from the device model and measured outputs of the imaging device is on the order of an expected error; and
adjusting image rendering on the imaging device to achieve a target behavior.

Claim 2. (Original) The method of claim 1, wherein measured outputs define a subset of device values substantially corresponding to neutral colors.

Claim 3. (Original) The method of claim 2, wherein the imaging device comprises a cathode ray tube, and wherein neutral colors have substantially equivalent red, green and blue device values.

Claim 4. (Original) The method of claim 1, wherein adjusting image rendering comprises adjusting image data applied to the imaging device.

Claim 5. (Original) The method of claim 4, wherein adjusting image data further includes creating entries for a lookup table (LUT) based on the device model.

Claim 6. (Original) The method of claim 4, wherein adjusting image data further includes creating a color profile for the imaging device based on the device model.

Claim 7. (Original) The method of claim 1, wherein the device model has one or more adjustable parameters, the method further comprising characterizing the imaging device with the device model by choosing values for the adjustable parameters of the device model.

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Claim 8. (Original) The method of claim 7, wherein a number of the adjustable parameters is less than a number of measured outputs of the imaging device.

Claim 9. (Original) The method of claim 7, wherein the imaging device is a cathode ray tube and the adjustable parameters comprise a gamma value and a black onset value.

Claim 10. (Original) The method of claim 1, wherein the imaging device is a cathode ray tube and the target behavior corresponds to a defined gamma value.

Claim 11. (Currently amended) A method of calibrating an imaging device comprising:
characterizing the imaging device with a device model having a set of adjustable parameters;
measuring color output from the imaging device; and
reducing error between the measured color output and expected color output as defined by the device model by adjusting the adjustable parameters of the device model such that an average error between the expected color output and the measured color output is on the order of an expected error.

Claim 12. (Original) The method of claim 1, wherein the imaging device is a cathode ray tube and the adjustable parameters include a gamma value and a black onset value.

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Claim 13. (Withdrawn) A method of calibrating a cathode ray tube comprising:
measuring outputs of the cathode ray tube for a subset of device values of the cathode ray tube;

choosing one or more adjustable parameter values of a device model for the cathode ray tube such that an average error between expected outputs determined from the device model and measured outputs of the cathode ray tube is on the order of an expected error, wherein a number of the adjustable parameters is less than a number of measured outputs of the imaging device; and

adjusting image data according to the device model to achieve a target behavior for the cathode ray tube.

Claim 14. (Withdrawn) The method of claim 13, wherein the subset of device values substantially correspond to neutral colors having values of red, green and blue on the order of one another.

Claim 15. (Withdrawn) The method of claim 13, wherein adjusting image data further includes creating a lookup table (LUT) based on the device model.

Claim 16. (Withdrawn) The method of claim 13, wherein adjusting image data further includes creating a color profile for the imaging device based on the device model.

Claim 17. (Withdrawn) The method of claim 13, wherein the parameters comprise a gamma value and a black onset value.

Claim 18. (Withdrawn) The method of claim 13, wherein the target behavior corresponds to a defined gamma value.

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Claim 19. (Withdrawn) A method of calibrating a cathode ray tube comprising:
initializing a lookup table (LUT);
adjusting settings of the cathode ray tube to substantially achieve a defined output;
measuring output for a number of color values;
choosing adjustable parameter values for a device model, wherein a number of adjustable parameters is less than a number of measured outputs; and
generating entries for the LUT based on the device model.

Claim 20. (Withdrawn) The method of claim 19, wherein adjustable parameters of the device model include a gamma value and an onset value.

Claim 21. (Withdrawn) The method of claim 19, wherein measuring output includes displaying a substantially white trace during measurement to bias an output measurement.

Claim 22. (Withdrawn) The method of claim 21, wherein the trace has a halo shape.

Claim 23. (Withdrawn) The method of claim 19, wherein the LUT resides in a video card.

Claim 24. (Withdrawn) A method comprising:
measuring output of a display device; and
displaying a substantially white trace during measurement to bias an output measurement.

Claim 25. (Withdrawn) The method of claim 24, wherein the trace has a halo shape.

Claim 26. (Withdrawn) The method of claim 24, further comprising displaying the substantially white trace during measurement to bias output measurements by approximately 0.5 to 1.0 percent.

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Claim 27. (Withdrawn) The method of claim 24, further comprising displaying the substantially white trace during measurement to bias an output measurement by an amount sufficient to ensure that the output measurement is within a dynamic range of a measurement device.

Claim 28. (Withdrawn) A cathode ray tube calibrated such that:
an average color error is approximately less than (0.75 delta e) from an analytical expected color output; and
a maximum color error is approximately less than (1.5 delta e) from the analytical expected color output.

Claim 29. (Withdrawn) The cathode ray tube of claim 28, wherein:
the average color error is approximately between (0.3 delta e) and (0.75 delta e) from the analytical expected color output; and
the maximum color error is approximately between (0.6 delta e) and (1.1 delta e) from the analytical expected color output.

Claim 30. (Withdrawn) The cathode ray tube of claim 29, wherein
the average color error is approximately between (0.3 delta e) and (0.4 delta e) from the analytical expected color output; and
the maximum color error is approximately between (0.6 delta e) and (0.8 delta e) from the analytical expected color output.

Claim 31. (Withdrawn) A set of cathode ray tubes, wherein each cathode ray tube in the set is calibrated such that:
an average color error is approximately less than (0.75 delta e) from an analytical expected color output; and
a maximum color error is approximately less than (1.5 delta e) from the analytical expected output.

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Claim 32. (Withdrawn) The set of cathode ray tubes of claim 31, wherein each cathode ray tube in the set is calibrated such that:

the average color error is approximately between (0.3 delta e) and (0.75 delta e) from the analytical expected color output; and

the maximum color error is approximately between (0.6 delta e) and (1.1 delta e) from the analytical expected color output.

Claim 33. (Withdrawn) The set of cathode ray tubes of claim 32, wherein each cathode ray tube in the set is calibrated such that:

the average color error is approximately between (0.3 delta e) and (0.4 delta e) from the analytical expected color output; and

the maximum color error is approximately between (0.6 delta e) and (0.8 delta e) from the analytical expected color output.

Claim 34. (Original) A computer readable medium storing program code that when executed calibrates an imaging device by:

characterizing the imaging device with a device model such that an average error between expected outputs determined from the device model and measured outputs of the imaging device is on the order of an expected error; and

adjusting image rendering on the imaging device to achieve a target behavior.

Claim 35. (Original) The computer readable medium of claim 34, wherein measured outputs define a subset of device values substantially corresponding to neutral colors.

Claim 36. (Original) The computer readable medium of claim 35, wherein the imaging device comprises a cathode ray tube, and wherein neutral colors have substantially equivalent red, green and blue device values.

Claim 37. (Original) The computer readable medium of claim 34, wherein adjusting image rendering comprises adjusting image data applied to the imaging device.

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Claim 38. (Original) The computer readable medium of claim 37, wherein adjusting image data further includes creating entries for a lookup table (LUT) based on the device model.

Claim 39. (Original) The computer readable medium of claim 37, wherein adjusting image data further includes creating a color profile for the imaging device based on the device model.

Claim 40. (Original) The computer readable medium of claim 34, wherein the device model has one or more adjustable parameters, the method further comprising characterizing the imaging device with the device model by choosing values for the adjustable parameters of the device model.

Claim 41. (Original) The computer readable medium of claim 40, wherein a number of the adjustable parameters is less than a number of measured outputs of the imaging device.

Claim 42. (Original) The computer readable medium of claim 40, wherein the imaging device is a cathode ray tube and the adjustable parameters comprise a gamma value and a black onset value.

Claim 43. (Original) The computer readable medium of claim 34, wherein the imaging device is a cathode ray tube and the target behavior corresponds to a defined gamma value.

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Claim 44. (Currently Amended) A computer readable medium storing program code that when executed calibrates an imaging device by:

characterizing the imaging device with a device model having a set of adjustable parameters;

measuring color output from the imaging device; and

reducing error between the measured color output and expected color output as defined by the device model by adjusting the adjustable parameters of the device model such that an average error between the expected color output and the measured color output is on the order of an expected error.

Claim 45. (Original) The computer readable medium of claim 44, wherein the imaging device is a cathode ray tube and the adjustable parameters include a gamma value and a black onset value.

Claim 46. (Withdrawn) A computer readable medium storing program code that when executed calibrates a cathode ray tube by:

measuring outputs of the cathode ray tube for a subset of device values of the cathode ray tube;

choosing one or more adjustable parameter values of a device model for the cathode ray tube such that an average error between expected outputs determined from the device model and measured outputs of the cathode ray tube is on the order of an expected error, wherein a number of the adjustable parameters is less than a number of measured outputs of the imaging device; and

adjusting image data according to the device model to achieve a target behavior for the cathode ray tube.

Claim 47. (Withdrawn) The computer readable medium of claim 46, wherein the subset of device values substantially correspond to neutral colors having values of red, green and blue on the order of one another.

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Claim 48. (Withdrawn) The computer readable medium of claim 46, wherein adjusting image data further includes creating a lookup table (LUT) based on the device model.

Claim 49. (Withdrawn) The computer readable medium of claim 46, wherein adjusting image data further includes creating a color profile for the imaging device based on the device model.

Claim 50. (Withdrawn) The computer readable medium of claim 46, wherein the parameters comprise a gamma value and a black onset value.

Claim 51. (Withdrawn) The computer readable medium of claim 46, wherein the target behavior corresponds to a defined gamma value.

Claim 52. (Withdrawn) A computer readable medium storing program code that when executed calibrates a cathode ray tube by:
initializing a lookup table (LUT);
adjusting settings of the cathode ray tube to substantially achieve a defined output;
measuring output for a number of color values;
choosing adjustable parameter values for a device model, wherein a number of adjustable parameters is less than a number of measured outputs; and
generating entries for the LUT based on the device model.

Claim 53. (Withdrawn) The computer readable medium of claim 52, wherein adjustable parameters of the device model include a gamma value and an onset value.

Claim 54. (Withdrawn) The computer readable medium of claim 52, wherein measuring output includes displaying a substantially white trace during measurement to bias an output measurement.

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Claim 55. (Withdrawn) The computer readable medium of claim 54, wherein the trace has a halo shape.

Claim 56. (Withdrawn) The computer readable medium of claim 52, wherein the LUT resides in a video card.

Claim 57. (Withdrawn) A computer readable medium storing program code that when executed:
measures output of a display device; and
displays a substantially white trace during measurement to bias an output measurement.

Claim 58. (Withdrawn) The computer readable medium of claim 57, wherein the trace has a halo shape.

Claim 59. (Withdrawn) The computer readable medium of claim 57, wherein the program code when executed displays the substantially white trace during measurement to bias output measurements by approximately 0.5 to 1.0 percent.

Claim 60. (Withdrawn) The computer readable medium of claim 57, wherein the program code when executed displays the substantially white trace during measurement to bias an output measurement by an amount sufficient to ensure that the output measurement is within a dynamic range of a measurement device.